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com 73. An apparatus for reducing speckle of a laser beam comprising a DUV-VUV reflecting substrate configured to alter at least a first portion of the beam reflected from a first region of the substrate relative to light reflected from outside of the first region of the substrate, such that the substrate generates a desired minimum number of spatially coherent cells in the laser beam.

2 12. The apparatus of Claim *1* 72, wherein the DUV-VUV transparent substrate includes a periodic phase shift optical coating over the first region, the phase shift optical coating causing a phase shift of light transmitted through the first region relative to light transmitted outside of the first region, such that the phase shift generates the desired minimum number of spatially coherent cells in the laser beam.

12 13. An apparatus according to claim *2* 12, wherein the transparent substrate comprises at least one material selected from the group consisting of fused silica, quartz glass, calcium fluoride, magnesium fluoride, lithium fluoride, strontium fluoride, and barium fluoride.

1 14. An apparatus according to claim *2* 12, wherein the optical coating comprises at least one material selected from the group of materials consisting of silicon dioxide and silicon nitride.

5 15. An apparatus according to Claim *2* 12, further comprising a fly eye lens.

6 16. The apparatus of Claim *6* 73, wherein the DUV-VUV reflective substrate includes a periodic phase shift optical coating over the first region, the optical coating causing a phase shift of light reflected by the first region relative to light reflected outside of the first region, such that the phase shift generates the desired minimum number of spatially coherent cells in the laser beam.

13 18. An apparatus according to claim *9* 16, wherein the phase shift optical coating comprises at least one material selected from the group consisting of silicon dioxide and silicon nitride.

14 23. The apparatus of Claim *1* 72, wherein the DUV-VUV transparent substrate includes a rough surface having a standard deviation in surface height and a correlation length, the